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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/228,148	01/11/1999	YASUNORI INOUE	970150A	7239

23850 7590 02/28/2002

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EXAMINER

MALDONADO, JULIO J

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 02/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/228,148

Applicant(s)

INOUE ET AL.

Examiner

Julio J. Maldonado

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 9-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *The Status of the Application*

1. The final rejection as set forth in paper No. 16 is withdrawn in response to applicants' Appeal Brief.
2. A new 103(a) rejection is made as set forth in this Office Action.
3. Claims 9-18 are pending in the application.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leong (U.S. 5,192,697) in view of Tu et al. (U.S. 6,001,745) and Wolf.

In reference to claim 9, 10, 13, 15-18 Leong (Fig.1-3) teaches a method for curing SOG by ion implantation including the steps of forming a first insulation film (24) on a conductive layer (20) formed on the substrate (10); introducing impurities into said first insulation film (24); forming a silicon oxide layer (22) prior to forming said first insulation film (24); forming a third insulation film (26) on said first insulation film (24) after said step of forming impurities into said first

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insulation film (24); that said first insulation film includes an inorganic SOG film; that the step of introducing is carried out by ion implantation; and that the impurities include argon.

However, Leong does not expressly teach using the silicon oxide layer as an intrusion prevention film to substantially prevent the impurities introduced into said first insulation film from entering said conductive layer.

Nevertheless, Tu et al. (Fig.2A) teaches in an analogous method the steps of forming a intrusion prevention film (31) to substantially prevent the impurities introduced into a SOG layer (32) from entering the conductive layer (20) prior to the step of forming said SOG layer (32), said intrusion prevention film (31) comprising silicon oxide.

It would have been obvious to one skilled in the art to include the teachings of Tu et al. into the method of Leong to arrive the claimed invention. The motivation/suggestion would be to include a prevention layer over a conductive layer prior to the formation of a SOG layer to prevent contaminants from entering the metal conductive layer (column 1, lines 34-39 and column 2, lines 61-66).

In reference to claims 11-12, Leong in combination with Tu et al. includes the step of forming a less hygroscopic insulation film on said conductive layer and said intrusion prevention film prior to said step of forming the first insulation film.

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In reference to claim 14 Leong in combination with Tu et al. teaches all aspects of the invention, but fails to teach that the first insulation film includes silicon oxide containing at least 1% of carbon. Nevertheless Wolf teaches, in an analogous art related to multilevel interconnect technology, that SOG films include silicon oxide should contain at least 1% carbon to improve cracking resistance (vol. 2, pages 232-233).

It would have been obvious to one of ordinary skill in the art to include the teachings of Wolf into the combination of Leong and Tu et al. for an expectation of success. The motivation/suggestion would be to include a SOG film containing at least 1% of carbon to improve cracking resistance.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 9-18 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-**

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**3432** . The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [julio.maldonado@uspto.gov](mailto:julio.maldonado@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

9. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

10. The following list is the Examiner's field of search for the present Office Action:

11.

Field of Search	Date
U.S. Class / Subclass(es): 438/624, 438/782	02/13/2002
Other Documentation: Wolf, S.; <i>Silicon Processing for the VLSI Era</i> ; Vol.2, Lattice Press; pgs 232-233	02/13/2002
Electronic Database(s): EAST (USPAT, PG-PUB, EPO, JPO DERWENT, IBM)	02/13/2002

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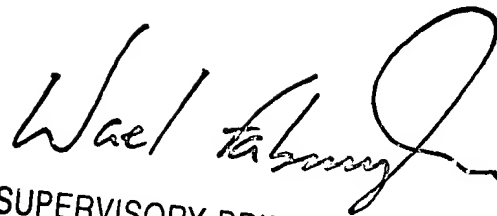
**Julio J. Maldonado**

Patent Examiner

Art Unit 2823

703-306-0098

julio.maldonado@uspto.gov

A handwritten signature in black ink, appearing to read "Wael Tabery". The signature is fluid and cursive, with a large loop at the end.

SUPERVISORY PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800